REMARKS

INTRODUCTION

Claims 1-29 were previously and are currently pending and under consideration.

Claims 1-29 are rejected.

Claims 23, 24 and 29 are objected to.

Claims 1, 9-11, 13, 22-24, 26 and 29 are amended herein.

No new matter is being presented, and approval and entry are respectfully requested.

INTERVIEW SUMMARY

Applicant thanks the Examiner for the Interview of December 8, 2004. At the Interview the Hirai reference was discussed. Applicant discussed the Hirai reference and in particular the fact that it does not select a tool using simulation. Applicant respectfully traverses the Examiner's statement in his "Interview Summary" that Hirai "has simulation". The simulation in the claims is 3D simulation such as with a CAD system, for example. Applicant respectfully requests a citation to the lengthy Hirai reference indicating where it teaches either simulation or 3D simulation. Applicant also distinguished between initial selection of a working means model or tool because it is mate-able with a standard part model or fastener, and further selection based on a result of simulation of the working means model working the standard part model. The Examiner suggested clarification of how selection is based on simulation. See claim 1, for example, which recites that the selection is based on a result of the simulation.

OBJECTIONS TO THE CLAIMS

Claims 23, 24 and 29 are objected to due to informalities. Corrections have been made. Withdrawal of the objection is respectfully requested.

REJECTIONS UNDER 35 USC § 103

In the Office Action, at pages 5-28, claims 1-5, 7, 8, 9, 12-18, 21-24, 27 and 29 were rejected under 35 U.S.C. § 103 as being unpatentable over Siddique in view of Goto and further in view of Hirai. This rejection is traversed and reconsideration is requested.

In the Office Action, at pages 28-33, claims 6, 19, 20, 25 and 28 were rejected under 35 U.S.C. § 103 as being unpatentable over Siddique in view of Goto and further in view of Hirai and Hirata.

In the Office Action, at pages 33-39, claims 10 and 11 were rejected under 35 U.S.C. § 103 as being unpatentable over Siddique in view of Goto and further in view of Vold.

In the Office Action, at pages 39-42, claim 26 was rejected under 35 U.S.C. § 103 as being unpatentable over Siddique in view of Goto and further in view of Hirata and Gupta.

HIRAI DOES NOT SIMULATE WORKING OF A STANDARD PART MODEL IN VIRTUAL SPACE TO AUTOMATICALLY SELECT A TOOL

Various independent claims are amended for internal consistency and clarity. For example, claim 1 previously recited "simulation of the working on one of the ...". However, in view of the preamble and the specification, "working of" is the actual meaning. Furthermore, it is clarified that the automatically selected working means model is one of a plurality that are pre-associated with the same standard part model that is being worked by simulation. These features were already present in some of the claims.

Claim 1, for example, recites "executing a three-dimensional simulation of the working of one of the standard part models with the working means model". There is a relation between the simulation and the determination. The relation is that according to or based on a result of the simulation of the working of the part, a condition of working the one standard part model is automatically determined to be satisfied. It is respectfully noted that selection based on or according to a simulation is not the same as the selection of a tool in Siddique based on mate-ability – this aspect of Siddique has already been compared to the working means model extraction of claim 1 and cannot now be compared to a different feature in claim 1. Put another way, Siddique has tool selection, but tool selection is either manual or based on a characteristic (as in Hirai). Siddique does not select a tool as a result of a simulation of working of a part by a working means model.

It is respectfully submitted that the rejection overlooks the entirety of the feature above. The feature is more than just automatic selection of a tool. The feature relates to automatic selection of a tool by the process of simulating its working of a standard part model to determine if the working condition was satisfied and thereby select a working means model. The simulating of the "working of a working means model" is done "in a virtual three-dimensional space" (see claim 1, preamble). In that virtual space, the standard part model being worked is arranged in the design model ("part models ... are arranged in the design model", preamble, claim 1), so the working simulation naturally involves this arrangement.

The rejection cites the Abstract, lines 1-9 of Hirai. This portion teaches automatic selection of a tool as one of the operations carried out during an actual machining process. The rejection cites column 4, lines 44-50 of Hirai. This portion cites another Japanese patent publication which, according to Hirai, "discloses ... [a]utomatic selection of a [threading] tool can be implemented by previously storing available shape data and the names of available machining steps for each of tools; and selecting a threading tool on the basis of the depth of a thread and a pitch between the threads which are obtained from shape data of a specific component" (emphasis added). The selection is based on predetermined data not determined during simulation; thread properties are only the requirements of a threaded hole that needs to be machined into the specific component. No simulation is needed to determine if a tool satisfies the threading conditions, and in Siddique tools are selected interactively. Furthermore, the cited Japanese patent publication makes no mention or suggestion of simulation in a virtual three-dimensional space.

The rejection also cites column 5, lines 44-60 of Hirai. This portion refers to another Japanese patent publication that decides available machining data, artificially inputs information about the material of a workpiece to be cut, and decides the suitability of a cutting bit "using the subroutine" which decided the available machining data. The cited reference summary in Hirai again makes no mention of simulation in a virtual three-dimensional space. Simply selecting a tool/bit using "available data" from machine tool characteristics and characteristics of the workpiece to be machined does not require any simulation of working of the bit, and no simulation of working of the bit is mentioned. Not only is there no mention or need for simulation, there is no indication that the cited Japanese reference simulates the bit working the workpiece in virtual three-dimensional space.

The rejection also cites column 52, lines 35-37, and column 52 line 65 to column 53 line 3. However, this portion also shows that simulation of working of the tool is not the basis for selection. Rather, selection is based on "shapes and sizes described in the input drawing, that is, bores, depths, groove widths, and groove depths". These are static predetermined characteristics of a groove portion that is to be cut away from a workpiece by a boring tool. Simulation is not necessary or indicated for selecting a boring tool. Furthermore, there is no suggestion or need for simulation of working of a boring tool in three-dimensional virtual space.

The cited portion spanning columns 52 and 53 is only designation of a tool by "manual designation of a tool ... or automatic determination of a tool" and "disclosing the limit size of a tool by combination of the tool and cutting conditions specified and input for each process with a pictorial pattern, and specifying a tool using a tool number registered in a tool file". Again, the tool is not automatically selected based on a determination per the simulation that it satisfies a working condition of the working means model. In contrast, the tool is selected based on pre-specified conditions and a tool registration number. The language of Hirai makes this distinction apparent; Hirai refers to a "cutting condition", which is not the same as a "working condition". According to the Merriam Webster Online Dictionary, to "work" is "to set or keep in motion, operation, or activity : cause to operate or produce <a pump worked by hand>". This is consistent with the "working means models" (tool/hand models) cited in Siddique, which are for operating fasteners to remove the fasteners. A cutting condition is not a working condition, and no simulation of cutting is needed to determine if the cutting tool will cut according to the specified cutting condition.

In sum, Hirai does not disclose simulating working of a standard part model by a working means model. The motivation given for the combination underscores this shortcoming of Hirai. The rejection states that Hirai would "allow selecting tools taking into account various factors; for machining operations these would be material to be removed, machining accuracy, and machining". However, none of these factors (conditions) are automatically determined during a simulation of working of working means. Nowhere does Hirai disclose simulation in virtual three-dimensional space that determines whether the listed conditions (accuracy, material to be removed) have been satisfied. In fact, these conditions are not types of conditions whose satisfaction can be determined with a simulation. These are only static pre-conditions of a component that is to be machined.

Although claim 1 is discussed above, other claims have similar features. Claim 27 recites "automatically determining whether or an extent to which the working means model, as arranged in its working arrangement, can work, in virtual three-dimensional space, the standard part model, by using the design model and working requirements of the working means model to automatically simulate the working means model working the standard part model; and based on the automatic simulating, automatically determining whether, among plural working means models mate-able with the standard part model, the working means model can work the standard part model as arranged in the design model". The cutting tools of Hirai are not mate-able with a standard part model. To "mate" is to "join or fit together : COUPLE ... to join together as mates ... to provide a mate for ... to become mated <gears that mate well>" (Merriam Webster Online Dictionary). One skilled in the art of tool use modeling would not equate cutting tools (e.g. drills, routers, gougers, etc.) with tools mate-able with and capable of working standard part models. The cutting tools in Hirai (1) are incorrectly compared to working means models of claim 27 because they are not mate-able with a standard part model, and (2) are incorrectly combined with tool models in Siddique because tool models in Siddique are mating type tools (e.g. screwdrivers), and tools in Hirai do not mate with standard parts, fasteners, etc. See also claims 10, 11, 13, 22, 23, 24, and 26.

Claim 27 has not been amended. Any new ground for rejecting claim 27 must be Non Final.

SELECTION BASED ON, ACCORDING TO, ETC. SIMULATION

As discussed above, various of the present claims select a working means model based on or according to simulation of working of a standard part model by a working means model. Applicant respectfully requests an explanation of how Hirai teaches this feature. The tool selection in Hirai is done by matching machining requirements with a tool that meets the requirements. Hirai offers no teaching that indicates how this could be done and no simulation is involved in tool selection. For example, there is no discussion of doing a working simulation of the working of a standard part model with a mate-able working means model. The cited portions of Hirai reveal selecting a tool "on the basis of the depth of a thread and a pitch between the threads", "on specific characteristics of machining tools, the properties of a workpiece [etc.]", "selecting a tool ... according to ... bores, depths, groove widths [etc.]". Column 52 lines 65-67 are cited. First, this portion has "manual designation" by specifying or inputting a tool and cutting

conditions. This is clearly not automatic tool selection. Second, the portion has "automatic determination of a tool", but this is not at all explained.

For further understanding in the specification, see Figures 11 and 12. Step B1 starts with a part, step B2 gets working means model data per an attribute of the part (that links to the working means model). Steps B7-B11 relate to routing the working means model to the part. If the routing experiences interference, then the model may be rotated or another working means model may be selected. When the part model is reacted by the working means model (B10), it has in effect mated with the part. When confirmation of workability such as a working range is needed for the working means model (B22), the working is simulated from B24 to B27. If the simulation of the working of the part by the working means model fails 9B25 to B28), adjustments may be made (e.g. rotate upon mating and try to simulate again B31). However, if the working condition of the tool is satisfied (B26), for example there is sufficient range of motion, then after the range is calculated (B37) and recorded (B38), step B19 is reached. Step B19 is the end of the simulation of the working of the part model and the result of the simulation is recorded. See also the paragraph at page 66, line 19 of the specification. A similar selective process occurs with respect to the simulation of working of the part by the working means model. Note also that working means models associated with a given part may be tested/simulated in order of preference or priority. Because the simulation may end when first a working means model is found that can route to and work the part, the simulation is selecting one of the candidate tools via simulation.

IMPROPER COMBINATION

The rejection proposes modifying Siddique with teachings of Hirai. The combination is traversed because modification of Siddique as proposed would (1) render unfit for its intended purpose, and (2) add no advantage to Siddique.

According to MPEP § 2143.01, if a "proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." The rejection proposes modifying Siddique to automatically select tool models. However, the intended purpose of Siddique is to combine automated and interactive disassembly modeling. Siddique

According to Siddique, "to generate a complete process model requires human

interaction and assistance" (page 3, bottom). The "disassembly process ... is completed by interactively disassembling the product in the virtual environment", what is automated is "ranges of feasible directions of component removal" (page xii). Regarding automated disassembly process generation, " when an automatic approach is used to generate a disassembly sequence ... the assembly or product has to be relatively simple – the assembly has to be partially ordered and the geometry of the components has to be relatively simple" (page 5, bottom). Also, "automatic approaches can be used only on assembly with simple configuration and geometry" (page 114, bottom). At page 15, Siddique's automated aspects of a disassembly process are (1) a partial sequence, (2) local removal directions. Page 76 discloses that "[a]utomated reasoning is used to determine component disassemblability, local directions of removal, and partial disassembly sequence." In contrast, "the user should be able to gather information regarding accessibility of fasteners by observation of clearance of tools and other factors as he/she goes through the task of disassembling the product" (page 16, second paragraph, emphasis added).

In sum, Siddique came up with a carefully balanced technique of disassembly modeling where certain aspects of disassembly are automated, but where the actual steps and evaluation of disassembly are determined interactively, for example by interactively selecting a tool and trying to use the tool. The suggested modification upsets this balance and defeats Siddique's stated purpose of allowing a user to evaluate, for example tool workability through the task of interactively disassembling the product.

The modification is also traversed because the advantage cited in Hirai is inapplicable to Siddique and would not improve Hirai. The rejection stated that Hirai's teachings would "allow selecting tools taking into account various factors; for machining operations these would be material to be removed, machining accuracy and machining". However, Siddique performs the complete opposite function of Hirai. Siddique is a system for disassembly modeling, where fasteners and parts are *taken apart* by a user. Hirai is a system for machining operations, where raw materials are *cut away by machining* (e.g. drilled, gouged, routed, lathed, etc.). Tools in Hirai cut away material and do not mate with fasteners or standard parts like the tools in Siddique. The other cited advantage of "taking into account material to be machined, machining tools, and machinery" (column 1, lines 19-20) is inapplicable to disassembly which uses no machining.

Put another way, Siddique makes a tool available for interactive selection during

interactive disassembly. The tool could be selected for availability automatically based on some criteria, but that would be selection before simulation of the tool working a part/fastener. Siddique requires interactive selection and manipulation of the tool, and so automatic selection thereof during or according to the simulation is contrary to the operating principle of Siddique.

The Examiner, in citing Hirai, appears to be reasoning that it is obvious to select tools automatically based on characteristics of the tool and/or the task it is to perform. However, selection by actual simulation of working of a part model in-situ is qualitatively different. Selection by simulation of working of the part model allows selection, for example, from a set of tools each which may be potentially capable of mating with or operating the part or fastener, but not all of which may be capable of satisfying a condition for working the part when it is arranged in the main body.

Withdrawal of the rejection is respectfully requested.

DEPENDENT CLAIMS

The dependent claims are deemed patentable due at least to their dependence from allowable independent claims. These claims are also patentable due to their recitation of independently distinguishing features. For example, claim 4 recites "working simulation execution section performs a simulation of a relationship in position/posture of the working means model to the standard part models based on the reference position information of the working means model and the standard part models". This feature is not taught or suggested by the prior art. Withdrawal of the rejection of the dependent claims is respectfully requested.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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